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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/525,686	02/22/2005	Stefan Kirchhoff	DN 02 - 011	9517
7590 Michael J Herman Minerals Technologies Inc One Highland Avenue Bethlehem, PA 18017				
			EXAMINER BROWN II, DAVID N	
			ART UNIT 1791	PAPER NUMBER
			MAIL DATE 01/06/2010	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/525,686

Applicant(s)

KIRCHHOFF ET AL.

Examiner

DAVID N. BROWN II

Art Unit

1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 19 October 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/CD)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

This is a final rejection in response to the remarks dated 10/19/2009.

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-7, and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,107,244 (Ochiai) in view of US 2002/0158368 (Wirth).
Ochiai discloses a "Method and apparatus for repairing damaged surface of refractory lined vessel," (title). In order to identify areas in need of repair, Ochiai teaches using a microwave transmitter or a laser emitter (col. 4 lines 19-24; col. 5 lines 1-43). Ochiai teaches (column 4 line 30) that the measuring device measures the residual thickness of the lining. "The distance r from the reference position to the surface of the wear lining 3 is obtained by detecting the phase difference between the transmission wave and reception wave, and is stored in the memory operation circuit 13 together with the signal of the position. Ochiai teaches the use of a processing unit that transforms the thickness data into binary data (column 6 line 63- column 7 line 3, column 5 lines 18-26). The values r and r_0 taught by Ochiai are binary and are taken to be the claimed "1 and 0" values. Ochiai teaches combining these areas into areas having thickness below the threshold value (column 4 lines 30-46). Ochiai teaches that there is a step that computes the position (column 4 lines 30-36) and repair sequence (column 5 lines 16-25) of each of the combined areas and transfers these data to a repair device and

applying material onto the combined areas computed by the processing unit (claims 1 and 10).

Ochiai does not teach that an adjacent combined area has a portion which was identified as not needing repair according to the threshold value. Wirth teaches a method for repairing refractory vessels (abstract). Wirth teaches assigning a matrix value for the areas of the vessel [0046]. Such use of a matrix assigns isolated positions with a corresponding matrix position. Wirth teaches that in such a matrix there are areas that need repair and other areas that do not [0046]. Thus Wirth teaches that an adjacent combined area has a portion having a value which indicates that the portion had a measured residual thickness which was equal to or higher than the predetermined threshold value. It would have been obvious to one having ordinary skill in the art at the time of the invention to use the matrix method of Wirth in the invention of Ochiai motivated by a desire to use a linear algebra based algorithm for deciding which areas need repair.

Claims 2-4, 6, 10, and 11:

The limitation in claim 2 is addressed in the title "... Refractory Lined Vessel" of the Ochiai patent. As for claims 3 and 4, Ochiai states in the background section (line 14,):
" The refractory lined vessels referred to in this invention are ladles, torpedo cars, mixers, converters, electric furnaces, spare or additional refining furnaces, and the like which are used in the steel making." The method of Ochiai is used on metallurgical vessels as claimed by the applicant. This method employs a non-contact measuring device such as a laser (addressing claim 6) or microwaves (column 4 line 67). The

controller, which is labeled element (19, Ochiai figure 6), electronically connects the measuring and repairing devices. This connection addresses applicant claim 10. Being that these devices are electronic, applicant claim 11 is hereby addressed.

Claims 5 and 7

With respect to claim 5, while Ochiai is silent on the particular ladle to be repaired, the repair of any ladle according to the Ochiai invention would be the same regardless to the particular use of the ladle. All of the ladles recited in applicant claim 5 have identical structures and would therefore be repaired in the same fashion. For these reasons, it would have been obvious in the art to use the repair operation suggested by Ochiai for repairing the particular ladles recited in this claim since the repair operation suggested by Ochiai would be equivalently applicable.

With respect to claim 7, Ochiai discloses using a laser-based measuring device. One skilled in the art would have known a mirror scanner to be in operation at the time of the invention. An artisan would have reasonably recognized and appreciated that that a mirror scanner is functionally equivalent to the scanning laser suggested by Ochiai. That is, the mirror scanner would be effective in detecting defect in a liner by scanning through an inner wall of a lined vessel and obtain a profile measurement distance of the inner wall. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to use a mirror scanning laser instead of a laser device as such is an art recognized effective means for detecting defect of a lined inner wall of a vessel.

Claims 12 and 13:

Wirth addresses applicant claims 12 and 13. In paragraph [0038] Wirth recites: "...laser reader 706 is used to acquire the point cloud... the point cloud represents the dimensions of the interior of the vessel as recognized by a person of ordinary skill in the art." Later (Wirth) discloses [paragraph 0046]: "The data extracted from the point cloud is compared with the reference vessel characteristics to establish the deficiencies in the vessel lining. With these deficiencies defined, corresponding matrix data is generated and stored in predefined matrices." The point cloud may be defined in three-space coordinates $f(x, y, z)$ or in terms of a cylinder by $f(\rho, \phi, z)$ with mathematical manipulation. It would be obvious to one having ordinary skill in the art at the time of the invention to use mathematical manipulation such as defining the defects in three-space coordinates $f(x, y, z)$ or in terms of a cylinder by $f(\rho, \phi, z)$ in order to map the defined defective areas to a computer in order to develop a repair program. Wirth also uses computer programs and geometry [paragraph 0045] in order to create simulations in 3-space. These simulations are used in calibration and repair paragraph 0046, 0101].

Claims 14 and 15:

Wirth discloses in the abstract: "The disclosed systems and methods further include means for comparing the 3D geometric data corresponding to the interior of the vessel with 3D geometric data provided as a reference, generating a 3D repair trace based on the comparison, and controlling a spray gun for applying refractory material according to the trace by taking into account a set of physical variables related to the vessel and the refractory material." The 3-D reference taught here is analogous to the simulation described in the applicant claims 14 and 15. This information is discussed again in

paragraph [0028]. The device computes the difference between the reference and the actual vessel in order to judge repair performance. One would appreciate the combined teachings of Ochiai and Wirth to repair vessels. It would also be obvious to one having ordinary skill in the art at the time of the invention to create a simulation program in order to calibrate the repair program or to measure the extent of the repair performed.

3. Claims 8 and 9 rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,107,244 (Ochiai) in view of US 2002/0158368 (Wirth) as applied to claim 1 and in further view of US Patent 4,690,328 (Roehl).

Ochiai addresses the movement of the device (Ochiai, claims 4 and 5). Not disclosed by Ochiai is whether or not the device is tilt-able. Roehl discloses a portable device for the repair of refractory linings that, according to the abstract, has an arm universally pivoted on a frame (abstract; col. 1 lines 28-32; col. 4 lines 50-65; figure 4). This arm is further described in the abstract as having a spray nozzle on the outer end. The device mentioned by Ochiai is intended to reach all areas of the refractory lining needing repair and is movable to accomplish such a purpose. Roehl uses a tilting mechanism in order to accomplish the same purpose. This is why one skilled in the art would recognize a tilting means as another means to move the device in order to accomplish the aforementioned task. It would have been obvious to one skilled in the art at the time of the invention to provide a tilting mechanism on a device of Ochiai in order to enhance the versatility of the device of Ochiai and to enable it to repair effectively lined vessel in a hard to reach area.

Response to Arguments

4. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.
5. Applicant argues that Ochiai does not teach a defragmenting step which combines areas in need of repair with adjacent areas not in need of repair. The matrix method taught by Wirth takes into account all areas of the vessel and includes areas that need no repair.

$$\begin{bmatrix} 100 & 100 & 50 & 50 \\ 50 & 100 & 100 & 100 \\ 50 & 50 & 100 & 100 \\ 50 & 50 & 50 & 100 \end{bmatrix} = \begin{bmatrix} (1,1) & (1,2) & (1,3) & (1,4) \\ (2,1) & (2,2) & (2,3) & (2,4) \\ (3,1) & (3,2) & (3,3) & (3,4) \\ (4,1) & (4,2) & (4,3) & (4,4) \end{bmatrix}$$

The matrices above represent those suggested by Wirth [0046]. Here it can be seen that the adjacent areas include areas that need not be repaired.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID N. BROWN II whose telephone number is (571)270-5497. The examiner can normally be reached on Monday-Thursday 7:30a-5:00p EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Del Sole can be reached on (571)-272-1130. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DAVID N. BROWN III/
Examiner, Art Unit 1791

/Joseph S. Del Sole/
Supervisory Patent Examiner, Art Unit 1791